1	1. A method of extracting power, comprising the steps of:				
2	coupling a transducer that converts mechanical power to electrical power to a				
3	disturbance,				
4	coupling an electrical circuit to the transducer such that a peak voltage				
5	experienced by the transducer is greater than two times higher than any peak voltage of				
6	an open circuit transducer due to the disturbance alone,				
7	extracting power from the transducer using the electrical circuit,				
8	storing extracted power, and				
9	powering the electrical circuit with power extracted from the disturbance.				
1	2. A method of extracting power, comprising the steps of:				
2	coupling a transducer that converts mechanical power to electrical power to a				
3	disturbance,				
4	coupling an electrical circuit to the transducer such that a peak of the integral				
5	of the current onto and off the transducer is greater than two times higher than any peak				
6	of an integral of a current of a short circuit transducer due to the disturbance alone,				
7	extracting power from the transducer using the electrical circuit,				
8	storing extracted power, and				
9	powering the electrical circuit with power extracted from the disturbance.				
1	3. A method of extracting power, comprising the steps of:				
	coupling a transducer that converts mechanical power to electrical power to a				
2	disturbance,				
4	measuring a mechanical state with a sensor,				
5	controlling an electrical circuit coupled to the transducer based on the				
6	measured mechanical state,				
7	extracting power from the transducer using the electrical circuit,				
8	storing extracted power, and				
9	powering the electrical circuit with power extracted from the disturbance.				
9	power and discursar circuit with power extracted from the disturbance.				

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1	4. A method of extracting power, comprising the steps of:
2	coupling a transducer that converts mechanical power to electrical power to a
3	disturbance,
4	coupling an electrical circuit to the transducer,
5	controlling switches of the electrical circuit such that the switches switch at a
6	frequency greater than two times an excitation frequency of the disturbance,
7	extracting power from the transducer using the electrical circuit,
8	storing extracted power, and
9	powering the electrical circuit with power extracted from the disturbance.
1	5. A system for extracting power, comprising:
2	a transducer that converts mechanical power to electrical power the

transducer configured for coupling to a disturbance,

an electrical circuit connected across the transducer such that a peak voltage experienced by the transducer is greater than two times higher than any peak voltage of an open circuit transducer due to the disturbance alone, the electrical circuit including an inductor including first and second terminals, the first terminal being connected to a first terminal of the transducer,

a first subcircuit connected to the second terminal of the inductor and a second terminal of the transducer, the first subcircuit including a switch, and

a second subcircuit connected to the second terminal of the inductor and the second terminal of the transducer, the second subcircuit including a switch, and a storage element for storing extracted power.

6. A system for extracting power, comprising:
a transducer that converts mechanical power to electrical power, the
transducer configured for coupling to a disturbance,
an electrical circuit connected across the transducer such that a peak voltage
experienced by the transducer is greater than two times higher than any peak voltage of
an open circuit transducer due to the disturbance alone, the electrical circuit including

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a rectifier circuit including first and second input terminals and first
and second output terminals, the first and second input terminal being connected across
first and second terminals of the transducer
an inductor including first and second terminals, the first terminal
hains connected to the first output terminal of the meetifier circuit, and

being connected to the first output terminal of the rectifier circuit, and
a subcircuit connected to the second terminal of the inductor and the
second output terminal of the rectifier circuit, the subcircuit including a switch, and
a storage element for storing extracted power.

7. A system for extracting power, comprising: a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbance.

an electrical circuit connected across the transducer such that a peak voltage experienced by the transducer is greater than two times higher than any peak voltage of an open circuit transducer due to the disturbance alone, and

a storage element for storing extracted power, the storage element and the electrical circuit being connected such that the storage element supplies power to the electrical circuit.

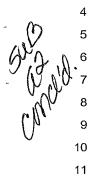
8. A system for extracting power, comprising:

a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbance,

an electrical circuit connected across the transducer such that a peak voltage experienced by the transducer is greater than two times higher than any peak voltage of an open circuit transducer due to the disturbance alone,

a storage element for storing/extracted power, and an independent power source for supplying power to the electrical circuit.

9. A system for extracting power, comprising: a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbance, and



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an electrical circuit connected across the transducer such that a peak of the integral of the current onto and off the transducer is greater than two times higher than any peak of an integral of a current of a short circuit transducer due to the disturbance alone, the electrical circuit including

an inductor including first and second terminals, the first terminal being connected to a first terminal of the transducer,

a first subcircuit connected to the second terminal of the inductor and a second terminal of the transducer, the first subcircuit including a switch, and a second subcircuit connected to the second terminal of the inductor and the second terminal of the transducer, the second subcircuit including a switch, and a storage element for storing extracted power.

10. A system for extracting power, comprising:

a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbance, and

an electrical circuit connected across the transducer such that a peak of the integral of the current onto and off the transducer is greater than two times higher than any peak of an integral of a current of a short circuit transducer due to the disturbance alone, the electrical circuit including

a rectifier circuit including first and second input terminals and first and second output terminals, the first and second input terminals being connected across first and second terminals of the transducer,

an inductor including first and second terminals, the first terminal
being connected to the first output terminal of the rectifier circuit, and
a subcircuit connected to the second terminal of the inductor and the
second output terminal of the rectifier circuit, the subcircuit including a switch, and
a storage element for storing extracted power.

11. A system for extracting power, comprising:

a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbance, and

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4	an electrical circuit connected across the transducer such that a peak of the
5	integral of the current onto and off the transducer is greater than two times higher than
6	any peak of an integral of a current of a short circuit transducer due to the disturbance
7	alone, and
8	a storage element for storing extracted power, the storage element and the
9	electrical circuit being connected such that the storage element supplies power to the
0	electrical circuit.

11 12. A system for extracting power, comprising: a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a disturbande, and an electrical circuit connected across the transducer such that a peak of the integral of the current onto and off the transducer is greater than two times higher than any peak of an integral of a current of a short circuit transducer due to the disturbance alone, 8 a storage element for storing extracted power, and 9 an independent power source for supplying power to the electrical circuit. 13. A system for extracting/power, comprising: 1 2 a transducer that converts mechanical power to electrical power, the transducer configured for coupling to a mechanical disturbance, an electrical circuit including switching electronics connected across the 4 transducer, the electrical circuit including an inductor including first and second terminals, the first terminal 6 7 being connected to a first terminal of the transducer, 8 a first subcircuit connected to the second terminal of the inductor and a second terminal of the transducer, the first subcircuit including a switch, and 9 10 a second subcircuit connected to the second terminal of the inductor

second terminal of the transducer, the first subcircuit including a switch, and
a second subcircuit connected to the second terminal of the inductor
and the second terminal of the transducer, the second subcircuit including a switch,
control logic which switch the switching electronics at a frequency greater
than two times an excitation frequency of the disturbance, and

0	14	a storage element for storing extracted power.
in the second	1	14. A system for extracting power, comprising:
M.,	M. 2	a transducer that converts mechanical power to electrical power, the
Mr.	,V 3	transducer configured for coupling to a mechanical disturbance,
Min	4	an electrical circuit including switching electronics connected across the
J	5	transducer, the electrical circuit including
	6	a rectifier circuit including first and second input terminals and first
	7	and second output terminals, the first and second input terminals being connected across
	8	first and second terminals of the transducer,
	9	an inductor including first and second terminals, the first terminal
est?	10	being connected to the first output terminal of the rectifier circuit, and
lj Ui	11	a subcircuit connected to the second terminal of the inductor and the
ui **	12	second output terminal of the rectifier circuit, the subcircuit including a switch,
4.0 	13	control logic which switch the switching electronics at a frequency greater
11	14	than two times an excitation frequency of the disturbance, and
	15	a storage element for storing extracted power.
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	1	15. A system for extracting power, comprising:
	2	a transducer that converts mechanical power to electrical power, the
ini. Fi	3	transducer configured for coupling to a mechanical disturbance,
	4	an electrical circuit including switching electronics connected across the
	5	transducer,
	6	control logic which switch the switching electronics at a frequency greater
	7	than two times an excitation frequency of the disturbance, and
	8	a storage element for storing extracted power, the storage element and the
	9	electrical circuit being connected such that the storage element supplies power to the
	10	electrical circuit.

16. A system for extracting power, comprising:



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2	a transducer that converts mechanical power to electrical power, the
3	transducer configured for coupling to a mechanical disturbance,
4	an electrical circuit including switching electronics connected across the
5	transducer,
6	control logic which switch the switching electronics at a frequency greater
7	than two times an excitation frequency of the disturbance,
8	a storage element for storing extracted power, and
9	an independent power source for supplying power to the electrical circuit.
1	17. A system for extracting power, comprising:
2	a transducer that converts mechanical power to electrical power, the
3	transducer configured for coupling to a disturbance,
4	an electrical circuit connected across the transducer and capable of extracting
5	power from the transducer and applying power to the transducer during different intervals
6	in the course of the disturbance, the electrical circuit including
7	an inductor including first and second terminals, the first terminal
8	being connected to a first terminal of the transducer,
9	a first subcircuit connected to the second terminal of the inductor and a
10	second terminal of the transducer, the first subcircuit including a switch, and
11	a second subcircuit connected to the second terminal of the inductor
12	and the second terminal of the transducer, the second subcircuit including a switch, and
13	a storage element for storing extracted power.
1	18. A system for extracting power, comprising:
2	a transducer that converts mechanical power to electrical power, the
3	transducer configured for coupling to a disturbance,
4	an electrical circuit connected across the transducer and capable of extracting
5	power from the transducer and applying power to the transducer during different intervals
6	in the course of the disturbance, the electrical circuit including
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7	a rectifier circuit including first and second input terminals and first
8	and second output terminals, the first and second input terminals being connected across
.9	first and second terminals of the transducer,
10	an inductor including first and second terminals, the first terminal
11	being connected to the first output terminal of the rectifier circuit, and
12	a subcircuit connected to the second terminal of the inductor and the
13	second output terminal of the rectifier circuit, the subcircuit including a switch, and
14	a storage element for storing extracted power.
1	19. A system for extracting power, comprising:
2	a transducer that converts mechanical power to electrical power, the
3	transducer configured for coupling to a disturbance,
4	an electrical circuit connected across the transducer and capable of extracting
5	power from the transducer and applying power to the transducer during different intervals
6	in the course of the disturbance, and
7	a storage element for storing extracted power, the storage element and the
8	electrical circuit being connected such that the storage element supplies power to the
9	electrical circuit.
1	20. A system for extracting power, comprising:
2	a transducer that converts mechanical power to electrical power, the
3	transducer configured for coupling to a disturbance,
4	an electrical circuit connected across the transducer and capable of extracting
5	power from the transducer and applying power to the transducer during different intervals
6	in the course of the disturbance,
7	a storage element for storing extracted power, and
8	an independent power source for supplying power to the electrical circuit.
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a transducer that converts mechanical power to electrical power, the

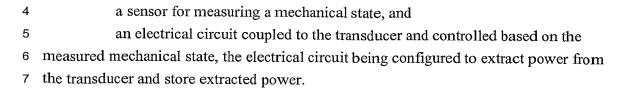
A system for extracting power, comprising:

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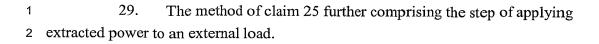
3 transducer configured for coupling to a disturbance,

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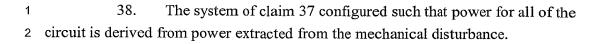


- 1 22. The system of claim 21 wherein the electrical circuit comprises a 2 resonant circuit.
- The system of claim 21 wherein the electrical circuit comprises switches controlled based on the measured mechanical state.
- 1 24. The system of claim 21 further comprising a plurality of transducers 2 configured for coupling to the disturbance.
- 1 25. A method, comprising the steps of:
 2 coupling a transducer that converts mechanical power to electrical power to a
 3 disturbance, and
- coupling an electrical circuit to the disturbance, wherein coupling the electrical circuit includes controlling switches such that all electrical power supplied to the transducer is derived from power extracted from the mechanical disturbance.
- 1 26. The method of claim 25 wherein power for the entire circuit is derived 2 from power extracted from the mechanical disturbance.
- 1 27. The method of claim 25 wherein a part of the circuit is powered by an 2 external source.
- 1 28. The method of claim 25 wherein a part of the circuit is powered by a 2 battery.

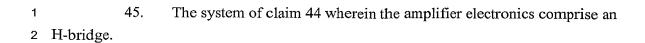


- 1 30. The method of claim 25 wherein the step of coupling the electrical circuit includes coupling a resonant circuit to the transducer.
- 1 31. The method of claim 25 wherein controlling switches includes 2 controlling a duty cycle of the switches.
- 1 32. The method of claim 25 wherein the step of controlling includes 2 monitoring a system state.
- The method of claim 32 wherein controlling switches includes controlling a duty cycle of the switches based on the system state.
- 1 34. The method of claim 25 wherein the step of coupling the electrical circuit acts to increase oscillations of the disturbance.
- 1 35. The method of claim 25 wherein the step of coupling the electrical circuit acts to dampen oscillations of the disturbance.
- 1 36. The method of claim 25 wherein the step of coupling the transducer 2 includes coupling a plurality of transducers to the disturbance.
- 1 37. A system, comprising:
- a transducer that converts mechanical power to electrical power, the
- 3 transducer configured for coupling to a disturbance, and
- an electrical circuit connected across the transducer, the electrical circuit
- 5 containing active switches such that all electrical power supplied to the transducer is
- derived from power extracted from the mechanical disturbance.

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- 39. The system of claim 37 further comprising an external power source 1 for supplying power to a part of the circuit.
- 40. The system of claim 39 wherein the external power source comprises a battery.
- 41. The system of claim 37 configured for damping oscillations of a 1 disturbance.
- The system of claim 37 wherein the electrical circuit comprises: 2 an inductor including first and second terminals, the first terminal being connected to a first terminal of the transducer, 3 a first subcircuit connected to the second terminal of the inductor and a second 5 terminal of the transducer, the first subcircuit including a switch, and 6 a second subcircuit connected to the second terminal of the inductor and the second terminal of the transducer, the second subcircuit including a switch. 7
- 43. 1 The system of claim 37 wherein the electrical circuit comprises: 2 a rectifier circuit including first and second input terminals and first and second output terminals, the first and second input terminals being connected across first and second terminals of the transducer, 4 an inductor including first and second terminals, the first terminal being 5 connected to the first output terminal of the rectifier circuit, and 6 7 a subcircuit connected to the second terminal of the inductor and the second output terminal of the rectifier circuit, the subcircuit including a switch.
- 44. The system of claim 37 wherein the electrical circuit includes 1 amplifier electronics.



- 1 46. The system of claim 44 wherein the amplifier electronics comprise a 2 half bridge.
- 1 47. The system of claim 44 wherein the electrical circuit further includes 2 control electronics for controlling the amplifier electronics.
- 1 48. The system of claim 47 wherein the control electronics control a duty 2 cycle of the amplifier electronics.
- 1 49. The system of claim 37 wherein the electrical circuit further includes a 2 sensor for monitoring a system state.
- 1 50. The system of claim 37 further comprising a storage element.
- 1 51. The system of claim 50 wherein the storage element comprises a 2 capacitor.
- The system of claim 50 wherein the storage element comprises a rechargeable battery.
- 1 53. The system of claim 50 wherein the storage element comprises two components connected in series, a side of the transducer being connected to a node between the two components.